REFLECTIONS ON THE EPA INTERPRETATION OF BEST PRACTICABLE TREATMENT

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ESO No. 214

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The Ohio State University
In Association With The Ohio Agricultural Research And
Development Center

November, 1974

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Introduction

The Water Pollution Control Act Amendments of 1972 (Public Law 92-500) specified that municipalities would have to provide plans and practices for the best practicable treatment in order to obtain matching federal funds for wastewater treatment facilities.[1] Just what that meant as far as coverage of alternative waste treatment schemes in the plans communities draw up was unknown and subject to the interpretation of the state granting agency and the U.S. Environmental Protection Agency (EPA). This left communities in a precarious situation and stalled waste treatment facility construction throughout the country. This added to the fund impoundment problem encountered during the past fiscal year.

Earlier this year a long awaited EPA interpretation of "best practicable treatment (BPT)" was made. The purpose of this note is to provide some interpretation and reflection on the report which may be useful to community planners who are contemplating sewage facility construction or expansion. Only those parts of the report which pertain to recent concerns about wastewater treatment planning and which deal with some new treatment schemes will be covered.

Best Practicable Treatment

Those who were confused about what the Act (Public Law 92-500) meant by best practicable treatment and were expecting some definitive statement on

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[1]Sections 201(b) and 201(g)(2)(A) of the Federal Water Pollution Control Act Amendments of 1972, [1].

which treatment scheme qualifies for federal funding under the Act have to be disappointed by the EPA report. The Federal EPA simply considers three broad classifications of treatment technology: land utilization and land application, treatment and discharge, and reuse technology. Each technology is to be considered on the basis of quite general criteria given in the recent statement.

The choice of which alternative to adopt is left to each municipality or regional sanitary district authority. The one distinguishing feature now specifically introduced into the choice is land treatment of effluent and sludge. This is important in light of recent concerns by communities in complying with the standards and the time table to meet the standards as set forth in the Act. However, land treatment is added as another alternative to the several liquids and solids disposing alternatives that come under the general treatment and discharge or reuse technologies. Thus the choice of the treatment approach must be guided by other criteria along with the general guidelines given by the EPA since passage of Public Law 92-500.

Let us review what Public Law 92-500 spells out regarding best practicable treatment. To do this, we extract the wording of parts of Sections 201 and 301.

> Section 201(b): Waste treatment management plans and practices shall provide for the application of the best practicable waste treatment technology before any discharge into receiving waters, including reclaiming and recycling of water, and confined disposal of pollutants so they will not migrate to cause water or other environmental pollution and shall provide for consideration of advanced waste treatment techniques.
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> Section 201(g)(2)(A): The administrator shall not make grants from funds authorized for any fiscal year beginning after June 30, 1974, . . . unless . . . alternative waste management techniques have been studied and evaluation and the works proposed for grant assistance will provide for the application of the best practicable waste treatment technology over the life of the works consistent with the purposes of this title.

> Section 301(b)(2)(B): In order to carry out the objective of this Act . . . there shall be achieved . . . not later than July 1, 1983, compliance by all publicly owned treatment works with the requirements set forth in Section 201(g)(2)(A) of this Act.[2]

The important parts of the Act for planning purposes are spelled out but in a rather broad way. The recent EPA statement has not gone much further in its interpretation of those guidelines but has specified guidelines for federal funding (in a previous statement) along with guidelines to consider alternative schemes.

First, the Act requires that the best practicable treatment alternative should be chosen which prevents migration of pollutants which cause water and other environmental pollution problems. Second, advanced waste treatment techniques must be considered. Federal funding will not be granted unless alternative waste management techniques have been studied and the best practicable facility chosen complies with the above requirement over the life of the works. Also the requirements set forth in Section 201(g)(2)(A) will be met by all publicly owned treatment works by July 1, 1983.

Additional Best Practicable Treatment Qualifying Criteria

Some additional criteria are given in the EPA report to qualify the best practicable treatment statement of the Act. First, and an important consideration, is that in order to receive federal matching funds, the project must be guided by EPA's cost-effectiveness regulations. These regulations have been promulgated separately and suggested to various state agencies who also approve wastewater treatment plans. In essence, this means that the proposal for assistance must include a study of alternative techniques suitable to the particular locality and which are in compliance with the requirements of Sections 201(b) and 201(g)(2)(A). Among these alternatives, one should be chosen which is not only in compliance with the Act but also the cheapest alternative. This narrows

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[2] From sections 201 and 301 of Public Law 92-500.

the choice of best practicable treatment somewhat and perhaps helps communities in their planning. It is precisely this requirement which has caused recent planning efforts to be centered on land disposal. More will be discussed on that later.

Second, the report also says that effluent reductions associated with secondary treatment will continue as the minimum prerequisite for federal funding in the next fiscal year. Additional treatment (and best practicable treatment) will depend on several factors such as available technology, local water quality standards, and life of certain treatment works. Requirements for secondary treatment have previously been outlined along with the time schedule for compliance for publicly owned facilities.[3]

Finally, once an alternative treatment technology is chosen it must comply with additional criteria. For example, ultimate discharge from any reuse system must conform to criteria for groundwater protection or, if discharged into a stream, must meet the secondary treatment effluent requirements. However, such criteria have been kept to a minimum to encourage reuse, at least at the federal level. The criteria for reuse projects are primarily dependent on the medium into which reused water is ultimately discharged. The two considerations of the report are, first, that the criteria should not result in a greater pollutant load than if the treatment and discharge or land application technologies were employed (and criteria these alternatives must meet); and second, the criteria should impose as few restrictions as possible to encourage reuse.

Land Disposal

The EPA report leaves no doubt that application of effluent and sludges on

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[3]Those standards recalled are BOD (30 mg/l), suspended solids (30 mg/l), fecal coliforms (200/100 ml), and pH (6.0 - 9.0) and are required of secondary treatment facilities by 1977 as spelled out in Public Law 92-500.

land should be an important consideration in the planning stage and proposals of communities for expanding or constructing new facilities. The emphasis on land treatment is based primarily on the costs involved. This is particularly true when land treatment costs are compared with advanced tertiary treatment alternatives which treat beyond the levels of secondary treatment technology.

One major concern of the EPA as expressed in the land disposal emphasis of the report is that communities may not be able to meet the 1983 deadline given the present treatment and discharge technology and the costs of upgrading these systems. In emphasizing land disposal, the EPA report concentrates on what may be the three water quality problems likely to remain after the application of secondary treatment requirements are met. These are concerns with oxygen-demanding materials, nutrients (nitrogen and phosphorus), and fecal coliforms. Approximately 50 percent of publicly owned treatment plants discharge into waters where water quality problems will not be solved by the existing regulations, and almost all of these plants are expected to require an effluent containing less oxygen-demanding material than obtainable by secondary treatment. About 7 percent will require phosphorus control, and 5 percent nitrogen control. The fecal coliform standards set for secondary treatment were set at levels which would ensure the highest recreational use and, as such, should not have to be changed upward.

The EPA report presents lengthy discussion of the costs and capabilities of land treatment, but the discussion is based on an earlier survey of facilities which are primarily located in semi-arid regions of the U.S. Most of these facilities are rather small in capacity and suited to irrigation technologies in the semi-arid regions.[4] Large scale system capability and cost estimate information is sketchy indeed, particularly for systems suited to sub-humid conditions.

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[4] See Sullivan, Cohen, and Baxter [4].

The EPA interpretation further accentuates the tone of legislation to encourage land treatment, or at least legislative history that led to the passage of Public Law 92-500. An earlier Senate version of the Act specified land treatment as the best practicable wastewater treatment technology, except where another technique was proven superior. The basis of superiority was not spelled out in that earlier version, however. The later House version of the legislation listed the same three approaches to treatment that we now find emphasized in the EPA report, i.e., treatment and discharge, reuse, and land utilization and application. The House version report on the legislation also stressed that land disposal should be emphasized in any EPA definition of best practicable treatment. Accordingly, the EPA has complied.

Land treatment is presented as an alternative to discharge and the problems that treatment and discharge technologies encounter with respect to ". . . further water and other environmental pollution . . ." as secondary effluent (containing high concentrations of nutrients) is discharged into streams. Denitrification and further reduction of BOD are costly and require extensive additional treatment.[5] However, land treatment has to be evaluated in light of various groundwater protection criteria. These criteria are primarily set by local and state water agencies.

Publicly owned water treatment plants incur considerable cost (based on EPA estimates) in attempting to remove heavy metals, dissolved salts, nitrates and organics from effluent prior to discharge. However, protection of groundwater means protection against contamination by chemicals, organics and pathogens. Most treatment facilities are designed and can economically reduce

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[5] Some advanced waste treatment cost estimates are available from the author as a result of a research effort sponsored by the Ohio Agricultural Research and Development Center [2] and from R. Smith [3].

pathogenic pollution to levels acceptable for drinking water.[6] Thus, criteria applied to land treatment (as suggested by the EPA report) in determining best practicable wastewater treatment technology must include the reduction of chemical and organic pollutants to raw or drinking water supply source levels. So, the criteria as spelled out in the report involve the conflicting goals of proposing land application which is in compliance with cost-effectiveness criteria while at the same time protecting against contamination of groundwater by chemicals, organics and pathogens.

Some Summary Remarks

The implications of the EPA interpretation for communities in Ohio who are planning new or expanded wastewater treatment facilities and are seeking federal matching funds under Public Law 92-500 are as follows:

1. A study of several alternative technologies suited to the particular location and waste load must be part of the planning process.[7]
2. A best practicable treatment technology must be submitted in any proposal for assistance and approval by the Ohio EPA and in compliance with the federal EPA ruling which interprets Sections 201 and 301 of Public Law 92-500.
3. Although the recent EPA report is still broad in its interpretive language, best practicable treatment means the proposed treatment system must be a treatment and discharge (conventional) system, or a land treatment system, or a reuse system which is the most cost-effective system for achieving secondary treatment standards

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[6] Research on the cost structure by the author and others indicate the costs of removal of pathogens decline as treatment capacity increases.

[7] Research currently underway at the Ohio Agricultural Research and Development Center may be of great help with respect to system operation and associated costs.

now set. The system must also be the cheapest for the removal of nutrients, oxygen-demanding materials and pathogens at levels such that no water or other environmental pollution occurs as a result of discharge.

4. If the system is to be a land disposal system, it must meet the cost effectiveness criterion and treat at levels which protect groundwater against contamination by heavy metals, dissolved salts, nitrates, organics and pathogens. The latter requirement implies that wastewater treatment technology must include the reduction of chemical and organic pollutants to raw or drinking water supply source levels. It is urged that land disposal be considered, but proposed only if it meets the above criteria for best practicable treatment.
5. If a reuse system is chosen, treatment levels must be in compliance with local as well as federal groundwater protection regulations. The ultimate discharge should not have a greater pollutant load than if a treatment and discharge or land application system were to be used. Groundwater is to be protected from contamination by nitrates, dissolved salts, heavy metals, organics and pathogens.

Most of the matching federal funds coming into the state of Ohio in the past have been allocated to larger communities in Ohio, i.e., those with populations over 10,000. Ohio has directed the funds to these communities because of severe pollution problems that exist in certain river basins such as in the Three Rivers Watershed and in general to those communities which discharge wastewater in tributaries to Lake Erie. Lake Erie and its tributary streams have been the target of water pollution abatement in accord with certain agreements and priorities which have been set. However, the legislation specifying 1983 as the deadline for advanced wastewater treatment levels applies to all publicly owned facilities.

Approximately one fifth of the population of Ohio resides in incorporated or unincorporated places with populations of 10,000 or less. Of these small communities, approximately 43 percent provide some type of central, public owned treatment service.[8] Actually, an estimated 80 percent of the residents who reside in communities having populations 10,000 or less are served by some central sewage treatment facility, either provided by the community or provided under contract with a larger city. These small communities have, for the most part, been excluded from matching funds in Ohio because they have not been priority targets for pollution abatement set by the Ohio Environmental Protection Agency. However, they do come under the same Public Law 92-500 requirements and require upgrading to meet those requirements.

Approximately 295 small communities operate their own facilities and 219 of these currently are secondary treatment facilities. Upgrading of 53 facilities from primary or intermediate treatment to secondary treatment standards needs to be done. Tertiary treatment of some form above secondary treatment is currently provided in only 25 communities who provide their own sewage treatment facilities. Some form of advanced treatment or removal of nutrients (phosphorus and nitrogen) must be provided by 1983 as specified by Public Law 92-500.

In Ohio, the Ohio Environmental Protection Agency (OEPA) has set quality standards requiring all systems to provide secondary treatment by 1977, following the federal directions. The state standards require that all secondary systems achieve 85 percent reduction in both BOD and suspended solids concentrations. More stringent standards may be imposed on communities with severe pollution problems.

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[8] For further detail concerning sewage service delivery to small Ohio communities, see a recent survey by Ward [6].

The alternatives open to small communities depend on the costs involved in offering sewage treatment by constructing and operating their own facility versus contracting with larger cities. An additional consideration is collection and transport costs of self-provision versus contract provision. For small rural communities, a serious look at individual dwelling aeration systems must be taken.[9]

Land disposal may be a prime consideration for the small community which is located some distance from a larger central facility. Land disposal systems will be emphasized at least at the federal level if they are shown to be the "best practicable treatment" alternative in any proposal for matching funds. As yet, specific guidelines regulating land disposal in Ohio have not been spelled out, but they will have to follow the federal guidelines as now interpreted in the federal EPA report.

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[9] Some further details of costs involved in small community sewage service delivery is the subject of research by the author sponsored by the Ohio Agricultural Research and Development Center. Some preliminary results are contained in a study by Ward [5].

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